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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/781,162

02/18/2004

Thomas L. Andrews

01-296

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01/24/2006

KLEIN, O'NEILL & SINGH

2 PARK PLAZA

SUITE 510

IRVINE, CA 92614

EXAMINER

RAHLL, JERRY T

ART UNIT

PAPER NUMBER

2874

DATE MAILED: 01/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/781,162

Applicant(s)

ANDREWS ET AL.

Examiner

Jerry T. Rahl

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 September 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1,3-13 and 15-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-13,15 and 18-20 is/are rejected.
- 7) ☒ Claim(s) 16 and 17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 February 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)             | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                    |

### DETAILED ACTION

1. The indicated allowability of the subject matter of claims 4-6, 15 and 18-20 is withdrawn in view of the newly discovered reference(s) to Innocenti et al. Rejections based on the newly cited reference(s) follow. The Examiner apologizes for any inconvenience caused.

#### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 3-6, 12-13, 15 and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by European Patent Application 0 892 244 to Innocenti et al.

4. Regarding Claim 1, Innocenti et al. describes an apparatus for detecting structural damage to a composite pressure vessel comprising an optical fiber (4) having a first end (at 7) and a second end (at 5n) adhered to an exterior surface of a composite pressure vessel (3), an injector (6) to inject light into the first end of the optical fiber and a detector (8) to detect a reflected portion of the light signal at the first end of the optical fiber that is representative of a location of damage to the vessel (see Column 1). See further Figure 1 and Columns 2-3.

5. Regarding Claim 3, Innocenti et al. further describes a comparator (9) to compare first and second light signals injected into the fiber at different times (Column 3 Lines 30-40).

6. Regarding Claim 4, Innocenti et al. describes an apparatus for detecting structural damage to a composite pressure vessel comprising an optical fiber (4) adhered to an exterior surface of a composite pressure vessel (3), a detector (8) operable to detect damage to the fiber

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representative of damage to the vessel (see Column 1), an injector (6) to inject light into an end (at 7) of the optical fiber and a detector (8) to detect the light signal at an end of the optical fiber, where the injector and detector are both coupled to a first end of the optical fiber (at 7), and wherein a second end of the optical fiber comprises a reflector (5n) to reflect a light signal injected from the first end back to the first end.

7. Regarding Claim 5, Innocenti et al. further describes a fiber optic connector (7) at the first end of the fiber.

8. Regarding Claim 6, Innocenti et al. further describes the light injector comprising a pulser to pulse the light signal into the optical fiber (see Column 3 Lines 30-40).

9. Regarding Claim 12, Innocenti et al. further describes the composite pressure vessel as a composite overwrapped pressure vessel (see Column 1 Lines 12-45).

10. Regarding Claim 13, Innocenti et al. further describes the composite pressure vessel as a gas storage vessel (see Column 1 Lines 1-5).

11. Regarding Claim 15, Innocenti et al. describes a method for detecting structural damage to a filament wound composite pressure vessel comprising winding an optical fiber (4) on and adhering it to an exterior surface of a pressure vessel (3), injecting first and second light signals into an end of the optical fiber at different times (see Column 3, Lines 30-40), detecting the first and second light signals at an end of the fiber (7), comparing the first and second light signals (9), injecting a light signal at a first end (6) of the fiber, reflecting the light signal from an opposite end of the optical fiber (at 5n) and detecting the reflected light at the first end of the optical fiber (8).

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12. Regarding Claim 20, Innocenti et al. describes a method for detecting structural damage to a filament wound composite pressure vessel comprising winding an optical fiber (4) on and adhering it to an exterior surface of a pressure vessel (3), injecting first and second light signals into an end of the optical fiber at different times (see Column 3, Lines 30-40), detecting the first and second light signals at an end of the fiber (7) and comparing the first and second light signals (9), where the optical fiber is wound on the composite pressure vessel in a uniform two-dimensional pattern in which the adjacent windings are spaced at a selected distance from each other and the winding pattern comprises helical or axial windings (see Figure 1 and Column 2 Lines 24-34).

***Claim Rejections - 35 USC § 103***

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

14. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Innocenti et al.

15. Claims 7-9 include the limitations of Claim 1, discussed above.

16. Regarding Claim 7, Innocenti et al. does not specifically describe the injector as a laser or LED. However, such devices are well-known in the art as the most commonly used injectors. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use a laser or LED as an injector in the device of Innocenti et al. The motivation for doing so would have been to use the well-known tuning and connection properties of lasers and LEDs.

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17. Regarding Claim 8, Innocenti et al. does not specifically describe the detector as a PIN diode or avalanche diode. However, such devices are well-known in the art as the most commonly used detectors. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use a PIN diode or avalanche diode as a detector in the device of Innocenti et al. The motivation for doing so would have been to use the well-known tuning and electrical properties of PIN diodes or avalanche diodes.

18. Regarding Claim 9, Innocenti et al. does not specifically describe the fiber having a fiber comprising polymer or silica. However, such materials are well-known in the art as the most commonly used fiber core materials. At the time of the invention, it would have been obvious to one of ordinary skill in the art to use silica or polymer as a fiber core material in the device of Innocenti et al. The motivation for doing so would have been to use the well-known refractive properties of silica or polymer materials.

19. Claims 10-11 rejected under 35 U.S.C. 103(a) as being unpatentable over Innocenti et al. as applied to claim 1 above, and further in view of US Patent No. 4,724,316 to Morton.

20. Regarding Claim 10, Innocenti et al. describes an optical apparatus as discussed above. Innocenti et al. does not specifically describe the optical fiber adhered to the exterior surface of the pressure vessel with a resin. Morton describes an optical fiber detection apparatus having an optical fiber (24) wound about a vessel (28, 38) and adhered using a resin (30, 40) (see Figures 4 and 6 and Columns 5-7). At the time of invention, it would have been obvious to one of ordinary skill in the art to use the resin described in Morton to attach the fibers in the apparatus of Innocenti et al. The motivation for doing so would have been to adequately secure the fiber to the vessel (see Column 5 Lines 60-65 of Morton). Therefore, it would have been obvious to one

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of ordinary skill in the art to combine Morton with Innocenti et al. to obtain the invention as specified in the present claims.

21. Regarding Claim 11, Morton further describes the optical fiber embedded in the resin (see Figures 4 and 6).

22. Claims 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Innocenti et al. in view of US Patent No. 4,724,316 to Morton.

23. Regarding Claim 18, Innocenti et al. describes a method for detecting structural damage to a filament wound composite pressure vessel comprising winding an optical fiber (4) on and adhering it to an exterior surface of a pressure vessel (3), injecting first and second light signals into an end of the optical fiber at different times (see Column 3, Lines 30-40), detecting the first and second light signals at an end of the fiber (7) and comparing the first and second light signals (9). Innocenti et al. does not specifically describe the optical fiber adhered to the exterior surface of the pressure vessel with a resin. Morton describes an optical fiber detection apparatus having an optical fiber (24) wound about a vessel (28, 38) and adhered using a resin (30, 40) (see Figures 4 and 6 and Columns 5-7). At the time of invention, it would have been obvious to one of ordinary skill in the art to use the resin described in Morton to attach the fibers in the apparatus of Innocenti et al. The motivation for doing so would have been to adequately secure the fiber to the vessel (see Column 5 Lines 60-65 of Morton). Therefore, it would have been obvious to one of ordinary skill in the art to combine Morton with Innocenti et al. to obtain the invention as specified in the present claims.

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24. Regarding Claim 19, Innocenti et al. describes the optical fiber wound on the composite vessel in a uniform two-dimensional pattern (see Figure 1) in which adjacent windings are spaced a selected distance apart from each other.

***Allowable Subject Matter***

25. Claim 16-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

26. Claims 16-17 describe the optical signal reflected by a discontinuity in the optical fiber and the location of the discontinuity detecting using the time taken for the light to reflect back to the detector. This is subject matter not described or reasonably suggested, in conjunction with the further limitations of the present claims, by the prior art of record.

27. The prior art of record describes the detection of the change in wavelength from reflection by Bragg gratings to detect damage to the optical fiber. There is no mention of using the reflection time to detect the damage.

***Conclusion***

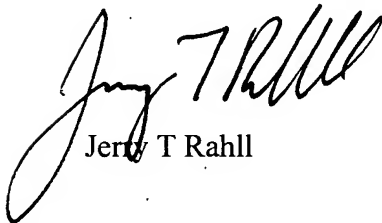
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jerry T. Rahll whose telephone number is (571) 272-2356. The examiner can normally be reached on M-Th (8:30-5:30).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

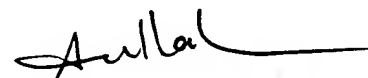


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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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